

Phaëton æthereus Linn. RED-BILLED TROPIC BIRD.

The birds breed in holes and crevices on the sides of the steep cliffs that often overhang the water; many were inaccessible. I was therefore able to reach and examine but few of their nesting places. These were without material of any kind for a nest; the egg (for they lay but one) was upon the bare rock. In nearly all, however, I found a young bird, about half grown; from this I think the birds begin to lay as early as the middle of February. With the aid of the Indians, who are expert climbers, I was only able to procure and save seven of their eggs. The ground color is dull grayish white, rather finely and evenly sprinkled with deep claret brown, generally thickest at large end, the specks running largely together, giving the eggs a clouded or marbled look. In form they are ovate. Measurements of the same, 2.31×1.71 , 2.40×1.72 , 2.40×1.78 , 2.26×1.71 , 2.49×1.81 , 2.40×1.69 , 2.38×1.68 . When approached the birds within their homes do not attempt to leave, but vigorously defend the same, striking and biting with their strong, pointed, sharp-edged, jagged bills, lacerating the ungloved hand that dares intrude, uttering at the same time a loud, harsh, rapid *che-che-che-che-che-che-che*,—notes of defiance, and often heard in their rival flights. The birds are very beautiful, and cannot fail to attract attention, especially when in the air, by the peculiar rapid stroke of their wings and graceful waving motion of their long whip-like tails.

FEEDING HABITS OF SOME YOUNG RAPTORES.

BY H. JUSTIN RODDY.

ALL raptorial birds, whether juvenile or adult, eat large quantities of food when it can be obtained. But they are able to endure long fasts. Digestion is rapid, as is absorption. In from one-half to one and a half hours after eating the stomach is empty, as are also the greater part of the intestines.

Young rapacious birds eat more than the adult birds, since both sustenance and growth must be provided for. By careful

comparison I think they eat more than those of any other class of birds. The actual quantity may not be so great but when quality is considered in connection with quantity the amount is greater. Their food is largely animal, the nutrient quality of which is of the highest character.

The great amount of nutriment is essential for their active life and predatory habits, in which the highest muscular exertion is necessary for securing their prey. The amount of food, therefore, is only an essential condition of their active life.

Cathartes aura. — A young Turkey Buzzard gorges itself with food to such an extent that it can hardly move. One will eat at a single meal a whole water snake (*Tropidonotus sipedon*) three feet long, as a young one once in my possession frequently did. Before it had a single feather it ate a house snake, three and a half feet long, equal in weight to one-fifth that of the bird. And in one and a half hours it was entirely digested, as I determined by killing and dissecting it at the end of that time.

The young birds are fed for a considerable time by the parents by ejection of food from the crop or stomach, where it had either been softened or partially digested. The young insert the opened bill into the mouth of the parent, and drink the food from it much as a fowl drinks water. The food is, probably, always quite moist or juicy, thus furnishing drink to the young bird at the same time.

The young birds kept in captivity drank water freely from any vessel as a fowl drinks, but were fonder of drinking from some vessel, as a bottle, with a narrow opening partially inverted, that the liquid might flow out. This must be because it is similar to the opened bill of the parents.

They are very fond of thrusting the bill into the opening formed by the partially closed hand. I inferred from this fact the manner of feeding before I had an opportunity of observing it.

They are fond of being caressed, or at least handled, especially so while feeding. In a few days after being placed in captivity they become fond of being handled, and soon follow persons about like dogs. They express pleasure by a low hiss; displeasure by a more forcible hiss.

They have a strong antipathy to dogs and express their displeasure the moment one appears in sight. Possibly they mistake

them for foxes, in whose company, or rather in proximity to whose dens, I have sometimes found the young in their nests. If a dog approaches near enough, the young Buzzard will attack him with bill, claws, and wings, using them very effectively.

Accipiter cooperi. — A young Cooper's Hawk I took from the nest when quite small, probably not more than two weeks after being hatched. It was without any difficulty reared to full size; indeed, to more than full size, for the abundance of good food and favorable conditions made it attain a more than ordinary size. In length it grew two and a half inches, and in alar expanse four inches, greater than the largest specimen in my collection, or of which I had any record.

It was a great eater. When six weeks old it ate nine English Sparrows (*Passer domesticus*) and a common mouse (*Mus musculus*) in one day; and ate on an average eight Sparrows a day from that time until it was ten weeks old.

At first I removed the remiges and rectrices and some of the other stiffer feathers of the birds I fed it. But when it had attained considerable size I gave it its food without such preparation. The bird ate them, feathers and all. This, however, influenced the amount it ate, — as one would naturally suppose, since these larger feathers filled up the crop and stomach, sometimes giving the bird trouble to eject them when the digestible portions had been absorbed. After attaining full growth it gradually came to be more choice in the selection of food, and always removed all of the larger feathers.

The bird became very much attached to me, and even when it could fly and was allowed its liberty did not leave, but returned every few hours for its food, which I always liberally provided. How long it would have continued to do this I do not know, as the experiment ended with its death. It was shot by one who did not know it was my pet.

In eating the bird tore its food to pieces with the bill, nearly always beginning at the entrails. It almost always seemed to relish the intestines more than any other part of the bird or animal, sometimes eating only this part and leaving the rest. When the bird or animal was still warm and the blood therefore uncoagulated, it tore it open and apparently bathed the bill in the blood and the visceral juices. It apparently sucked up these fluids in order to allay thirst. But I invariably found it

refuse water,—in this respect acting quite differently from the *Cathartes aura*, which drank water freely.

It rejected cold and stiff birds which had lain a day or more, especially when abundance of food was furnished. Perhaps this is owing to the coagulated condition of the blood and the drying up of the visceral juices, of both of which it appeared to be so fond.

It made no sounds to express pleasure or displeasure during captivity, but when free and flying made the sounds common to the adults of this species.

***Buteo pennsylvanicus*.**—Side by side with the *Accipiter cooperi* I reared a *Buteo pennsylvanicus* of about the same age. The characters of the two birds were essentially different. The fierce aspect of the *Accipiter* showed itself quite early, and indicated by its every action its rapacity and daring. The *Buteo*, on the other hand, was mild in appearance and never exhibited the fierceness nor voracity of the *Accipiter*.

But I succeeded better in petting the latter. It seemed to grow rapidly fond of my company. The *Buteo*, however, neither expressed pleasure, nor showed displeasure upon my coming near it, though it would make itself felt when one attempted to handle it. It never, however, used its claws with the same spirit as the *Accipiter*. I could handle the latter with impunity after it grew to know me. Strangers, it fought with spirit and resisted all their attempts at familiarity. The *Buteo* regarded all alike, seemingly neither as foes nor as friends.

Its voracity was not nearly so great as that of the Cooper's Hawk. It never at any time ate more than five Sparrows a day, and generally fewer than five. It, too, was more dainty in its feeding, nearly always pulling the feathers before eating. It was fond of insects, especially preferring grasshoppers, and ate frogs and fish with apparent relish. This the *Accipiter* did only when very hungry.

If any preference was shown by these Hawks in the selection of food, it was for food in the form of warm birds. And I experienced some difficulty in procuring enough Sparrows for them. I wished to supply in abundance the food they preferred, in order to make the conditions of their growth most favorable, and further to test their effect upon physical organization. The effects were apparent in larger size and more robust physique.

The Buteo never fed in my presence with the same freedom that the Accipiter did, nor were its actions so free. The latter's boldness and daring manifested themselves in every action.

Syrnium nebulosum.—Lastly I had a juvenile Barred Owl in my possession. In it, as in the others, abundance of food produced the same effects—larger size and more robust organization. The food most preferred was birds and small rodents; frogs and fish were eaten when quite fresh, though the latter were taken only when hungry. Insects, too, were eaten.

Digestion was rapid, requiring about one and a half hours for the digestion and absorption of a pair of Sparrows. Birds were always eaten without pulling a feather. If not too large they were swallowed whole, for the throats of young Owls are quite capacious. The indigestible parts are ejected when digestion is completed.

The Owl never, except once, fed knowingly in my presence (and it was difficult to observe its habits without its knowledge). Its sense of sight is so acute, and its range of vision so extended, that I was compelled to use many devices to deceive the bird and accomplish my purpose of observation without being observed. The food put into its cage was seldom eaten until pressed by hunger, and the bird never ate in a day more than one-third the quantity of food eaten by the Accipiter in the same time.

It could not easily be petted, nor did it acquire a fondness for being handled. Indeed it seemed to remain unaffected by kindness, and to love solitude.

NOTES RELATIVE TO THE SENSE OF SMELL IN THE TURKEY BUZZARD (*CATHARTES* *AURA*).*

BY C. L. HOPKINS.

DURING the recent months there has been a good deal of discussion in several of the scientific and sporting papers regarding the sense by which Buzzards find their food; and while taking

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